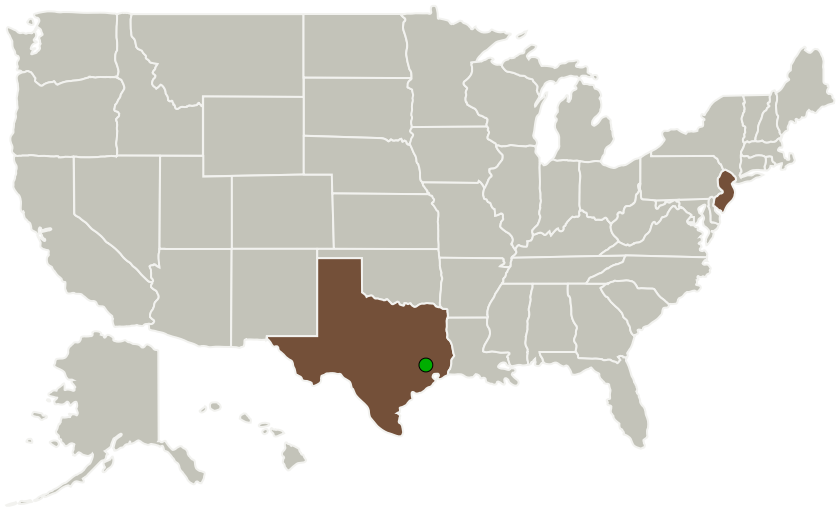
High Turndown Ratio, High Delta-Emittance, Variable Emissivity Electrochromics, Phase II

Completed Technology Project (2012 - 2014)

Project Introduction

Among thermal control methods, variable-emittance materials remain the most promising for addressing deficiencies of current systems (mechanical louvers, loop heat pipes, MEMS, electrostatics, phase change materials, others), especially, e.g., for missions in extreme light/dark environments, planetary platforms. This firm's unique, patented variable-emittance skin technology, based on conducting polymers, microporous membranes and ionic liquids, with proven, space-environment performance, remains at the world forefront, with highest known Delta-emittance, good Turn-Down Ratio (TDR), very low power, low cost. Phase I work demonstrated separate emittance variation from 0.065 to 0.816, Delta-emittance > 0.48, and long-term space durability, with one "breakthrough" innovation, two very significant innovations. A clear, specific pathway was demonstrated for combining low/high emittance in single devices to achieve TDR of 7.1, possibly 10.0. Phase II work will use this as basis to increase the TDR to > 7.1, possibly > 10.0, keeping the dark-state emittance ca. >/= 0.80. Surface Solar Absorptance will be further reduced from present ca. 0.31 to as low as possible (objective 0.09 to 0.24). Other Phase II tasks, following completion of TDR optimization, will address Controller, further space-qualification testing, manufacture, space-flights, commercialization pathway, other issues. Two identified commercial partners will assist in marketing.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Ashwin-Ushas Corp, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Holmdel, New Jersey
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
New Jersey	Texas

Project Transitions

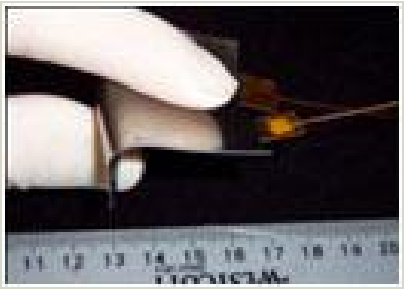
April 2012: Project Start

April 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138153)*

Images



Project Image
High Turndown Ratio, High Delta-Emittance, Variable Emissivity Electrochromics
(https://techport.nasa.gov/image/128236)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Ashwin-Ushas Corp, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Prasanna Chandrasekhar

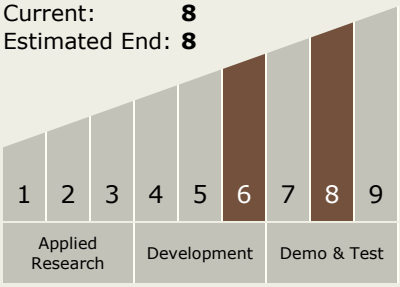
Co-Investigator:
Prasanna Chandrasekhar

High Turndown Ratio, High Delta-Emittance, Variable Emissivity Electrochromics, Phase II

Completed Technology Project (2012 - 2014)

Technology Maturity (TRL)

Start: **6**
Current: **8**
Estimated End: **8**



Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.2 Thermal Control Components and Systems
    - TX14.2.3 Heat Rejection and Storage

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System